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~~Luncheon Address~~
by
James E. Webb, Administrator
National Aeronautics and Space Administration
at
THE ECONOMIC CLUB OF DETROIT
April 2, 1962

"What's Next in Space?"

Good afternoon, Ladies and Gentlemen:

I appreciate your welcome and the opportunity to be here today. Two and a half years ago, the first Administrator of the National Aeronautics and Space Administration, the Honorable T. Keith Glennan, of Cleveland, spoke to you in these words:

> At the end of World War II, many Americans were comfortable in the asseumption that the Soviet Union was hopelessly backward in science. The United States had the atomic bomb -- had it exclusively.
>
> The Russians were bogged down in reconstruction and in tangled economic problems... And they were only a generation removed from a benighted medievalism...

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Yet,four short years after we exploded our first A-bomb, the Russians managed to produce their own.

Only nine months after the United States had achieved the hydrogen bomb, the Soviet Union had it too.

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Another severe jolt shook the Free World on October 4, 1957. ...when the first Soviet Sputnik was fired into orbit, ...

Again and again,that first man-made, Russian satellite went beeping and spiraling its way about the globe. ...visible to the naked eye. People the world around beheld it and were impressed.

The story was repeated when the second, larger Sputnik II went into orbit -- again before we had been able to loft our first Explorer I satellite into orbit.

...the American people were truly alarmed. They levelled criticism at our educational system, at the military establishment, at the Congress -- at almost any likely target. They demanded a vigorous space program.

Some advocated a program run by the military services; others felt that the tremendous possibilities opening with the Space Age should not be devoted exclusively to military purposes. A great national debate followed. Congress established the National Aeronautics and Space Administration, a civilian agency.

To ensure maximum progress in the development and use of the large rockets and boosters required to do useful work in space and to develop the capability for manned space flight, a National Launch Vehicle Program was established to meet the needs of both the military services and the National Aeronautics and Space Administration.

Arrangements were made for the coordination of the military and civilian programs in other areas, and the foundation was laid for space activities which have brought this Nation in the four intervening years to the point where it has successfully launched more than 60 satellites. These satellites have been used to expand man's bank of knowledge about the basic laws of nature, and to add greatly to our store of military knowledge and capability.

The program has drawn many scientists and many nations into a cooperative effort to employ the new knowledge and capability in space for the benefit of all mankind. It has developed the technology that permits us to move on with other nations to create international communications networks based on satellites, and an international meteorological reporting system based on satellite observations and reports of weather phenomena around the world.

Further, in our space program we have carried out Project Mercury to prove that man can, to use President Kennedy's words, "sail on this great new ocean of space."

In the field of aviation, 45 years of development were required from the Wright Brothers' flight to the modern jet airplane capable of linking the world, removing geographic, time, and distance barriers. All of you know that the airplane uses the atmosphere as a working medium and as a source of the oxygen which its engines burn. Perhaps not all of you have recognized that the vehicles and engines of the Space Age are not dependent on the earth's atmosphere, either as a working medium or as a source of oxygen.

Dr. Robert Goddard, the great American rocket pioneer, demonstrated that the liquid-fuel rocket can carry its own oxidizer in the form of liquid oxygen. He devoted his life to proving that this radical new vehicle and engine could enable man to escape through the earth's atmosphere into the space beyond, to open vast new horizons for exploration.

Out of Dr. Goddard's work have developed sounding rockets, which go outward from the earth about the distance of one earth radius or some 4,000 miles, carrying instruments to measure whatever scientists and engineers need to know more about; scientific satellites that can circle the earth for long periods and if sent in highly elliptical orbits, go outward from the earth hundreds of thousands of miles and swing back near the earth, taking continuous measurements; and deep-space probes which require the greatest amount of rocket power to overcome the pull of the earth's gravity and escape outward toward the sun and planets and send back measurements. Scientists all over the world use this data to increase their knowledge of the basic laws of nature and to build the technologies that advance civilization and improve the lot of man.

Since we live in a world where the future of our country would be in jeopardy if nations bent on worldwide domination and power should succeed in utilizing modern science and technology to establish a military base strong enough to achieve their purposes, we must always look to our own defenses which also rest on an advancing base of science and technology. Our national space effort is patterned to meet both our military and our civilian needs. The advances and technology of each support the other.

As I noted earlier, the decision of Congress, enacted in the National Aeronautics and Space Act, was to form a new civilian agency with the scientific and technical competence within its own ranks -- built around the National Advisory Committee for Aeronautics (NACA) -- which had served the Nation so well in the development of aviation since 1915. The new National Aeronautics and Space Administration continued the responsibilities of NACA in aeronautical research, and projected its activities beyond the atmosphere, out into space.

In the years since 1958, NASA has been strengthened by the addition of highly competent technical groups -- from the Naval Research Laboratory, the Jet Propulsion Laboratory of the California Institute of Technology, and the von Braun group from the Army.

The Act of 1958 places on NASA special requirements. Its activities were to be as open as possible; the scientific community was to be consulted in making and carrying out its plans; and provision was to be made "for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

Recognizing the long lead time between conception, design, and flight of large space-booster systems, the Law also requires a long-range plan.

Under the previous Administration, such a plan had been established, to cover the period of the present decade and on into the 1970's.

Between the establishment of NASA in 1958, and the end of the Eisenhower Administration, a substantial build-up was already in progress. A reasonable estimate of expenditures during the decade of the 'Sixties to carry out this plan would lie between 20 and 25 billions of dollars.

But in his final budget, for the 1962 Fiscal Year, President Eisenhower made the determination not to recommend to Congress funds for the large boosters and spacecraft required for manned space flight beyond Project Mercury.

This, then, was the situation that existed when President Kennedy took office. Within two months and four days after his inauguration, the United States launched five satellites. In the same period, the Russians launched three satellites and a Venus probe. Space activity was coming to the forefront as never before as an element of international competition.

An intensive study went forward under the direction of Vice President Johnson, with the active participation of such senior officials as a gentleman whose name is not unknown in Detroit, the Secretary of Defense, Mr. McNamara. Others taking part were Dr. Glenn Seaborg, the Chairman of the Atomic Energy Commission, Dr. Hugh Dryden, the NASA Deputy Administrator, and several teams of technical experts.

The actions by President Kennedy came in two stages.

First, late in March it was determined that the United States could not afford a slowdown in building big boosters. A special request for an increase of $125 million was sent to Congress to speed up work in this field.

During the next two months, an intensive analysis was made of every facet of the space program. Participating in the analysis was the reorganized National Aeronautics and Space Council, under the strong leadership of Vice President Lyndon Johnson.

As the result of this study, on May 25, the President proposed major new goals for the Nation in space, and new programs to achieve them. These programs included expanded activity for both unmanned and manned exploration of space, the moon, and the planets, the development of systems to make practical use of satellites for world communications and for weather prediction, and the flight-testing of a nuclear rocket as early as possible.

One important consideration was that in marshalling the resources for a manned landing on the moon before the end of the decade, we would be expanding and accelerating our most advanced technology as vigorously and as rapidly as practicable. This, in turn, would substantially increase our military and industrial potential.

All the objectives in the present National Space Program had been approved by the previous Administration. The long-range plan drawn up under President Eisenhower called for landing a team of American explorers on the moon in the years beyond 1970 -- probably about 1975. The determination made by the present Administration, with the endorsement of Congress, was that, as long as we were going to do these things, we should do them as soon as we could develop the technological capability to do them.

This determination was not made in isolation, of course. It was made in the face of a series of impressive demonstrations by the Russians of what they could do in space. In February 1961, the Russians launched a satellite weighing 14,000 pounds -- more than four times the weight of the Friendship Seven spacecraft in which John Glenn orbited the earth this winter. The spacecraft launched toward Venus in that same month weighed 1,400 pounds. In April of that year, a Russian cosmonaut, Gagarin, became the first man to orbit the earth in space.

In the face of these demonstrations, it became obvious that the United States could not do less than its best in space if we were to remain a first-class Nation.

It is important to note that the Secretary of Defense was a full participant in these determinations. There are no military missions contemplated today that would require giant launch vehicles such as Saturn. However, long lead times are needed to develop such boosters -- much longer than to develop the payloads. If military missions demanding very large boosters are necessary in the future, we shall have developed in this NASA program the necessary rocket power.

You are keenly aware, I am sure, that in the present decade, if we can avoid war, the number of our fellow countrymen requiring food, clothing, and services will rise from one hundred and eighty million to two hundred and thirteen million.

Public and private construction will rise from an annual rate of $55 billion to more than $90 billion. More than $700 billion of construction will be put in place; and with the addition of some three hundred to four hundred billions of maintenance and repair, our investment in these capital items will add up to more than a trillion dollars toward the end of the period. In this same time, the space program will invest some $35 billion in the most advanced areas of science and technology, involving new materials, fabrics, and lubricants, new efficiencies in the use of energy, new and very advanced electronics and new work to marry these with the life sciences.

It is important to note that a large portion of the investment in space activity is for plant capacity. We have some rather unusual plant requirements. We require large facilities for building spacecraft and for testing and launching them. We are creating a complex of facilities adjacent to water transportation and in a warm climate where it will be possible to work outdoors for a large portion of the year. These facilities will serve the Nation for many years to come. Design, engineering, and parts manufacture are done all over the Nation, but the final assembly, test, and launch will be in these new facilities.

The policy of the present Administration is to press forward in all related areas of science and technology at the most rapid rate that can be justified by the state of the art, without involving the wastefulness of crash programs.

In our programs, science in space has not been subordinated to man-in-space projects. On the contrary, this work has been increased and given added emphasis as necessary first steps in all of our programs. Research that can be conducted here on earth on the scientific and technological problems associated with space has also been increased wherever this was the most efficient way to accomplish the desired results.

Work in aeronautical research and in the study of atmospheric flight has been increased and extended to determine areas in which gains can be obtained for the space program or for manned flight in the atmosphere.

Now, briefly, where do we stand today -- what is in the National Space Program?

For the Fiscal Year that begins July 1, the Administration has requested five and one-half billion dollars for this Nation's activities in space. About two-thirds of that sum -- $3.78 billion -- would be expended by NASA. The remainder goes to the Department of Defense, the Atomic Energy Commission, the Weather Bureau, and the National Science Foundation.

In the NASA program, we have first a very active flight schedule using large rocket vehicles to enable man to move through the atmosphere and on out into space. The purpose here is to learn what we need to know about space itself and the return from space into the earth's atmosphere, and to gather information about the earth-sun phenomena which are so important in understanding the physical laws which govern life on earth.

We are actively studying the space environment through use of a large number of flights of sounding rockets which carry instruments into the high reaches of the atmosphere and beyond, into space itself. Since 1958, the United States has successfully launched more than 60 major scientific satellites and deep space probes, three of which are in orbits around the sun.

We are proceeding with the program for developing still larger multi-purpose vehicles for utilization in our space sciences program.

In February, for example, we launched the Orbiting Solar Observatory.

OSO is in an orbit some 350 miles above the earth. It is seeking to learn the causes of solar storms and other sun phenomena where earlier satellites were only able to record their results. All the complex equipment is working perfectly. OSO is performing a wide variety of experiments to provide more detailed understanding of the earth, the sun, the earth-sun relationship, and of the universe.

The sun-pointing accuracy of OSO instruments is such that if an automatically piloted airplane, taking off from New Orleans, were pointed to the Chicago Airport with this accuracy and the heading were unchanged, it would arrive within a mile of the intended spot.

It is still too early to report scientific results. However, OSO instruments are sending back great amounts of information about the ultraviolet, X-ray, and gamma ray light from the sun -- radiation that affects the earth's upper atmosphere and also produces the ionosphere from which long-distance radio communications are reflected back to earth. By learning more about the sun and its variations, our scientists hope to be able to predict when radio communications will be difficult, and when this radiation will produce changes in our weather.

There will be other such large spacecraft as the Orbiting Astronomical Observatory, and the Orbiting Geophysical Observatory. These new types of spacecraft have telemetering equipment to handle a large number of experiments and transmit the data back to earth. They are so versatile that on each launching they can carry into space entirely different sets of experiments, when this is desirable.

In addition, we have an extremely active program to explore the moon and planets with instrument-carrying spacecraft. In the Ranger program, we plan to land instruments on the moon to measure seismic -- or moonquake -- activity. Later, a much larger spacecraft called Surveyor will land more than a ton of scientific devices on the moon. Most of these unmanned flights will lend support to the later manned lunar expedition.

We are proceeding also with deeper space exploration. Our unmanned planetary program will obtain preliminary information about the near planets, Mars and Venus, investigate the sun and the vast regions between the planets, and search for evidences of life forms, past or present, elsewhere in our solar system.

We plan to launch an instrumented spacecraft toward Venus this summer. A more advanced model will be tested next year. Later, there will be flights to both Mars and Venus.

We have a vigorous program in the area of applications. Last year we began developing three major communications satellite concepts -- two designed for low orbits and one for high-altitude synchronous orbits -- at which altitude the satellite revolves every 24 hours and is synchronous with the rotation of the earth. The first is Project Relay, financed by the Government, and the second is Project Telstar, completely financed by the American Telephone and Telegraph Company, The Syncom, or synchronous-orbit satellite, is financed by the Government and keys closely into military needs in connection with the Advent program, which is also a high-altitude synchronous satellite.

We will be working with the Navy also in connection with civilian utilization of the Transit satellite which has demonstrated that it has great value to our military services for navigation and which many believe will have wide commercial applications.

Of course, I must also mention our program of manned space flight. You know that on February 20 we reached the initial goal of the Mercury program with the flight of John Glenn three times around the earth. This flight was just a beginning of our manned exploration of space. We must conduct repeated flights, to obtain the data scientists and engineers need to plan and conduct future programs.

Further three-orbit flights will take place in Project Mercury this year, at intervals of 60 to 90 days. Then late in the year or early next year, flights will begin with a Mercury spacecraft modified so that it has the capability of remaining in orbit up to 24 hours.

Next, we are developing the two-man spacecraft Gemini (named for the twin Constellation Castor and Pollux). Gemini's flight program will be very much like that for the X-15, our experimental rocket-powered plane which is probing the region where the earth's atmosphere thins out into the near-vacuum of space. Gemini will give us extensive experience in manned space flight and will prove experimentally the things we need to know before we move into heavy expenditures for Project Apollo and the Advanced Saturn.

The Advanced Saturn is a very large rocket -- a launch vehicle with a cluster of five engines, each of which will deliver a thrust of a million and one-half pounds. The first stage will generate approximately five times the power of Saturn which was test flown late last year and is still the largest known object that man has sent into space to date.

Both the early Saturn and the Advanced Saturn will boost the three-man Apollo spacecraft. With the smaller Saturn, Apollo will be capable of orbiting the earth. With the Advanced Saturn, it will be able to fly near the moon to investigate its surface, radiation, and other of its phenomena -- and then return into the earth's atmosphere at some 25,000 miles an hour.

But even this giant Advanced Saturn will not have enough weight-carrying power to land Apollo on the moon and return it to earth. Therefore, we have an option. We can either join the payloads of two Advanced Saturns in orbit around the earth and thus build in space the spaceship to go to the moon, or we can construct a still larger launch vehicle -- the Nova, which would require roughly twelve million pounds of thrust in the first stage. Nova would be powerful enough to carry into orbit a payload of 350,000 pounds -- about 100 times the weight of the Mercury spacecraft.

Obviously, it will be a gigantic task to carry all these steps through, and it will be expensive. If it does prove possible to join two Advanced Saturn payloads in orbit around the earth -- a technique called "rendezvous" -- we can save about two years and a large amount of money. We shall develop and test this advanced experimental program with the two-man Gemini spacecraft.

In order to develop the rendezvous technique, we shall be working with the Air Force to orbit an Atlas-Agena launch vehicle which will then be joined in orbit with the two-man spacecraft. These two-man missions will go forward during the next few years. The project by its very nature will also be developing capability for military utilization, should that be required.

As I have mentioned, among the most significant products returned from the national investment in this program, are assets of continuing value such as our worldwide tracking and data acquisition network, our deep space network, our basic facilities through which the new generation of large launch vehicles and spacecraft can be manufactured in plants across the United States, brought together for fabrication outside New Orleans near the mouth of the Mississippi River, tested at a site near by in Mississippi, and then transported by water to Cape Canaveral.

The capacity of the Nation for progress, represented by these assets, and the brainpower and skills which will make it possible, will be required for a long time.

In the management of this large program, we let large contracts to industry and place on the contracting firms the tasks, obligations, and responsibilities involved. But we are also proceeding prudently to try out and test such programs step-by-step. We are contracting in one-year increments so that we can speed up, slow down, or adjust the program as we learn from experience.

Finally, may I point out that from the beginning of the accelerated space program, the President emphasized that top officials of the Government must work together closely. He made it clear that he expected the Vice President and the Space Council to insist on this in every phase of the program. Thus, in the top echelons of Government, an effective organization and pattern has been worked out.

The men who are being recruited to hold executive positions in the space program -- whether promoted from within the Governmental structure or brought in from industry or the universities -- are, in my opinion, as outstanding a group as I have ever worked with.

Today, only four years after the first man-made satellite went into orbit, space activities are rapidly becoming the focal area for the most advanced work in scientific and technological disciplines. At the same time, highly important lines of development in economics, education, and international affairs are converging on space exploration and its supporting activities.

In marshalling and developing the scientific and technical resources required for manned exploration of space, the United States is creating a science and technology that is certain to radiate great and diversified benefits to many areas of economy, the professions, education, everyday living, and to our relations with other nations.

May I repeat what John Glenn said before a Joint Meeting of Congress on February 26: "I feel we are on the brink of an area of expansion of knowledge about ourselves and our surroundings that is beyond description or comprehension at this time."

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